

Translation

PATENT COOPERATION TREATY

PCT/DE2003/003221



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2002P13061WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DE2003/003221	International filing date (day/month/year) 26 September 2003 (26.09.2003)	Priority date (day/month/year) 06 November 2002 (06.11.2002)
International Patent Classification (IPC) or national classification and IPC G01F 1/688		
Applicant SIEMENS AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 28 May 2004 (28.05.2004)	Date of completion of this report 15 February 2005 (15.02.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE2003/003221

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
 pages \_\_\_\_\_ 1-10, 12, 15 \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_ 11, 13, 14 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 13 August 2004 (13.08.2004)
- ☒ the claims:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement under Article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_ 1-24 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 29 November 2004 (29.11.2004)
- ☒ the drawings:  
 pages \_\_\_\_\_ 2/3, 3/3 \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_ 1/3 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 13 August 2004 (13.08.2004)
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

- These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE 03/03221

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	1-24	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-24	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

### 2. Citations and explanations

#### 1.

This report makes reference to the following search report citations:

- D1: DE 298 21 233 U1 (GTC KAPPELMEYER GMBH)  
6 May 1999 (1999-05-06)
- D2: DE 199 50 111 C (GESO GES FUER SENSORIK GEOTECH)  
15 February 2001 (2001-02-15)
- D3: WO 00/11317 A (WILLIAMS GLYNN; NEUROTH DAVID H  
(US); BAKER HUGHES INC (US); DALRYMPL)  
2 March 2000 (2000-03-02)
- D4: DE 12 20 147 B (DAIMLER BENZ AG) 30 June 1966  
(1966-06-30)
- D5: EP-A-0 392 897 (LUXTRON CORP) 17 October 1990  
(1990-10-17)
- D6: DATABASE WPI Section EI, Week 199025 Derwent  
Publications Ltd., London, GB; Class S02,  
AN 1990-192052 XP002286791 & SU 1 508 170 A  
(KAZAN AVIATION INST) 15 September 1989  
(1989-09-15)

The following document has recently been introduced into the proceedings:

D7: US 6 442 304 B1 (CHEVRON INC) 27 August 2002  
(2002-08-27)

2.

**PCT Article 33(3)**

The subject matter of the claims in their entirety cannot be considered inventive.

2.1 Preliminary observation

The amendments submitted with the letter of 26 November 2004 concern the concretizing of the location-dependent temperature measurement by means of the optical waveguide, namely using Bragg gratings, and the indication that the measurement is carried out "in a flow duct". Although the international search report citations contain no specific reference to temperature measurement using Bragg gratings, a person skilled in the art is very familiar with the possibility of measuring temperatures in a resolved manner using Bragg grating sensors; see, for example, newly introduced document D7.

Therefore, although the claims of the present application meet the novelty requirement (PCT Article 33(2)), in light of the citations, no inventive activity can be recognized in the selected temperature measuring method specifically mentioned, for the above-mentioned reason.

2.2 Claim 1 (and corresponding method claim 13)

D1 discloses a

measuring element (fibre-optic temperature sensor, consisting *inter alia* of an optical waveguide; see, e.g. page 4, paragraph 1) for determining a flow

speed of a fluid flowing about the measuring element, with an optical waveguide for guiding an electromagnetic wave along its longitudinal extension (above-mentioned optical waveguide) and at least one electrical heating element which is arranged adjacent the optical waveguide (see page 4, paragraph 2) and by means of which heat can act upon the optical waveguide, it being possible for an electromagnetic wave that can be coupled into the optical waveguide to be influenced as a function of the optical waveguide temperature that is dependent on the fluid flow speed (see, e.g. page 4, paragraphs 1 and 4; clearly, the flow speed can be used as a quantifiable variable of the "fluid movement").

The difference between the subject matter of claim 1 and D1 is that the configuration of the fibre-optic temperature measurement is specifically mentioned and it is specifically stated that the measurement takes place "in a flow duct". Although D1 (page 2, paragraph 2) mentions a Raman scattered light measurement by way of example, D7, for example, already states that Bragg gratings can be used as an alternative for the same purpose (see, e.g. figure 21, and column 15, line 60, to column 16, line 11, in particular column 16, lines 8 to 11).

The fact that the measurement is carried out in a flow duct cannot be considered a delimitation: first, the physical sequences (i.e. fluid movements near the optical waveguide) enabling the temperature to be measured by means of the selected method are naturally the same in all applications. Second, D1 even discloses the fact that the permeable medium can also be a "duct-comprising medium"

(cf. page 5, final paragraph). It is clear from the description of D1 that at least part of the optical waveguide used therein can run through such a duct. Therefore even the novelty of the newly introduced feature appears questionable with respect to D1.

To sum up, the subject matter of claims 1 and 13 (the measurement along the longitudinal extension of the waveguide is derived from D1, page 5, lines 8 to 10, of the final paragraph) is not inventive.

Moreover, the subject matter of claim 1 also appears not to be inventive with respect to the inventions according to D2 and D3 (e.g. in light of D7).

#### 2.3 Claims 2 to 4

See documents D1 to D3.

#### 2.4 Claim 5

Although the use of an optical waveguide coating as heat conductor is not explicitly mentioned in the cited prior art, such a coating is suggested, for example, in the penultimate paragraph on page 6 of D1 (since a person skilled in the art would be familiar with the coating of glass fibre cables and such a coating is one example of the cable encapsulation mentioned in D1).

#### 2.5 Claims 6 and 7

Heat conductors with resistance coatings are well known in the art; all heat conductors suitable for the respective application can clearly be used in the inventions as per D1 to D3, and thus a special selection does not require any inventive activity.

The fact that these resistance coatings should have an approximately constant resistance in the operating temperature range is self-evident for a person skilled in the art.

#### 2.6 Claim 8

See D1, penultimate paragraph on page 7, for example.

#### 2.7 Claim 9

See D1 and D2.

#### 2.8 Claim 10

Although the use of a ceramic material for encapsulation purposes is not expressly mentioned in the citations, a person skilled in the art would proceed with encapsulation according to the circumstances and if necessary also use a ceramic material, for example. Such a selection cannot be considered inventive.

#### 2.9 Claims 11 and 12

See, for example, D1, page 6, final paragraph, and continuation on page 7.

#### 2.10 Claim 14

The use of an electromagnetic pulse (e.g. laser pulse) is known, for example, from the documents on which D1 is based (i.e. describing the mode of operation of the fibre optic temperature measurement) and to which D1 expressly refers. Therefore the subject matter of this claim is also known from D1.

#### 2.11 Claim 15

See D1 to D3.

**2.12 Claim 16**

Acting upon the heating element with a constant current is one of several alternative possibilities which a person skilled in the art would consider without thereby being inventive.

**2.13 Claims 17 and 18**

See D3, page 5, final paragraph, to page 6, first paragraph, where conclusions are also made about the flow speed or flow rate from two measurements with different heat influence (one without and one with additional heating).

**2.14 Claims 19 to 24**

The usefulness of the D1 or D2 measuring device in a flow machine is clear to a person skilled in the art; he would make the necessary adaptations as a matter of routine practice and therefore they cannot be considered inventive. Moreover, D4, which is concerned with a similar invention, suggests the use in a gas turbine.

**3. FURTHER OBSERVATION**

Contrary to the requirements of PCT Rule 5.1(a)(ii), the description did not cite D1 to D7 or the relevant prior art contained therein.